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Green Hydrogen Organization Fertilizer Roundtable

Closing the Gap: How Pricing Externalities Drives Viability in Green Fertilizer Projects

Date: March 20th, 2025



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- **Purpose-built analytical platform** for assessing green fertilizer project viability.
- Combines **financial modeling** with critical externalities:
 - Fertilizer access and distribution costs
 - Volatility protection (hedging against gas and fertilizer price fluctuations)
 - Food security and agricultural productivity impacts
- Provides scenario-based insights tailored specifically for **emerging market contexts**.
- Conduct “pre-feasibility” studies faster.



Case Study Structure: Three Step Analysis



Cost of Capital

Green Fertilizer
Cost Breakdown

Pricing
Externalities



Brazil's Fertilizer Industry & Case Study Selection



Map of Brazil



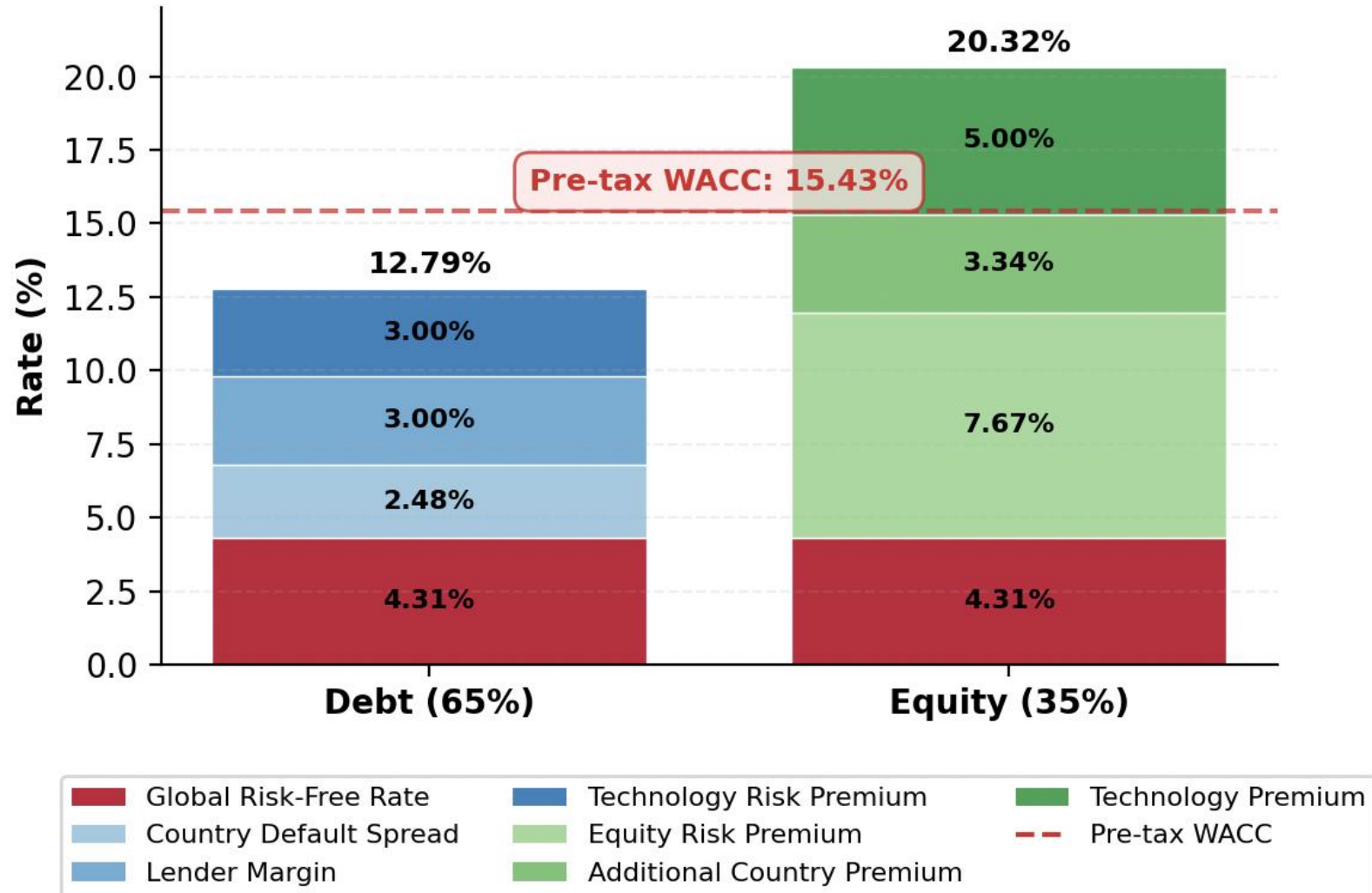
Case Study Location: **Rondonopolis**

- Brazil imports approximately **85%** of its fertilizer.
- Highly reliant on international natural gas markets and foreign currency.
- **Rondonopolis**, in Mato Grosso, is a critical agricultural hub producing Brazil's largest soybean and corn harvests, heavily reliant on imported fertilizers.
- **High inland transportation costs** to Rondonopolis **amplify fertilizer price volatility**, making it an ideal location to evaluate benefits of domestic green fertilizer production.

Emerging Markets Pay a Premium for Capital



WACC Estimate for Brazilian Green Ammonia Projects

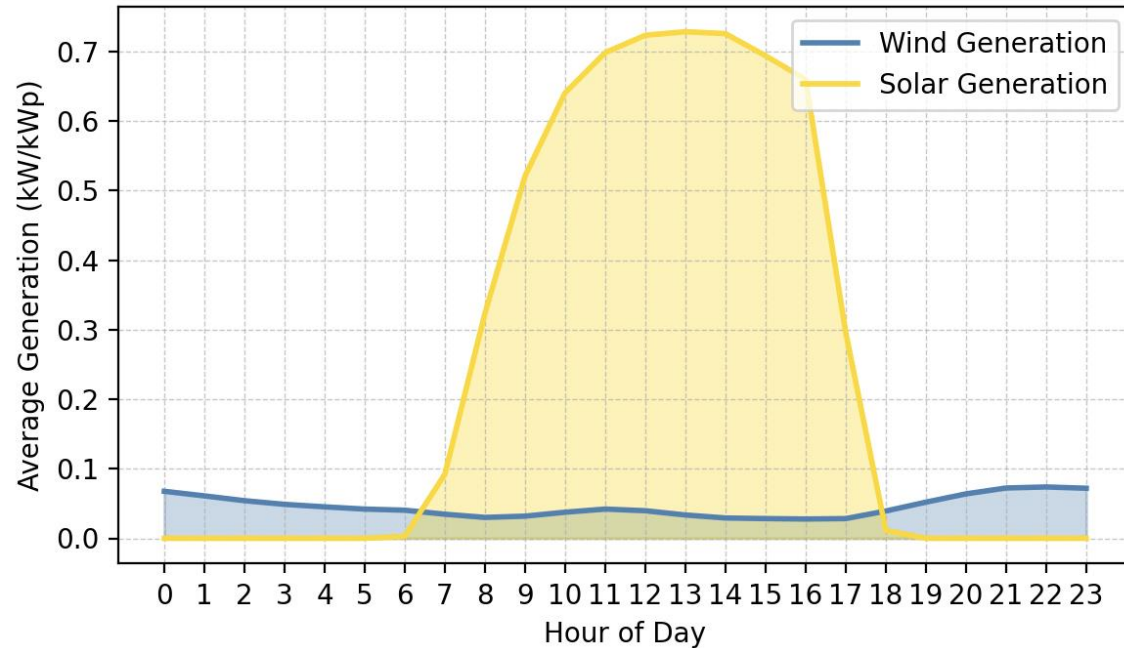


- **Emerging markets pay a premium:** Brazil's financing costs (WACC) are **>500 bps** higher than developed markets like the U.S.
 - Brazilian green ammonia projects are **40% more expensive** due to financing costs alone.
- **Closing the competitiveness gap:**
 - Leverage superior renewable energy resources.
 - Secure concessional financing or targeted subsidies.
 - Factor in **additional externalities to improve economics.**

A High Cost of Capital Results in Expensive Green Ammonia

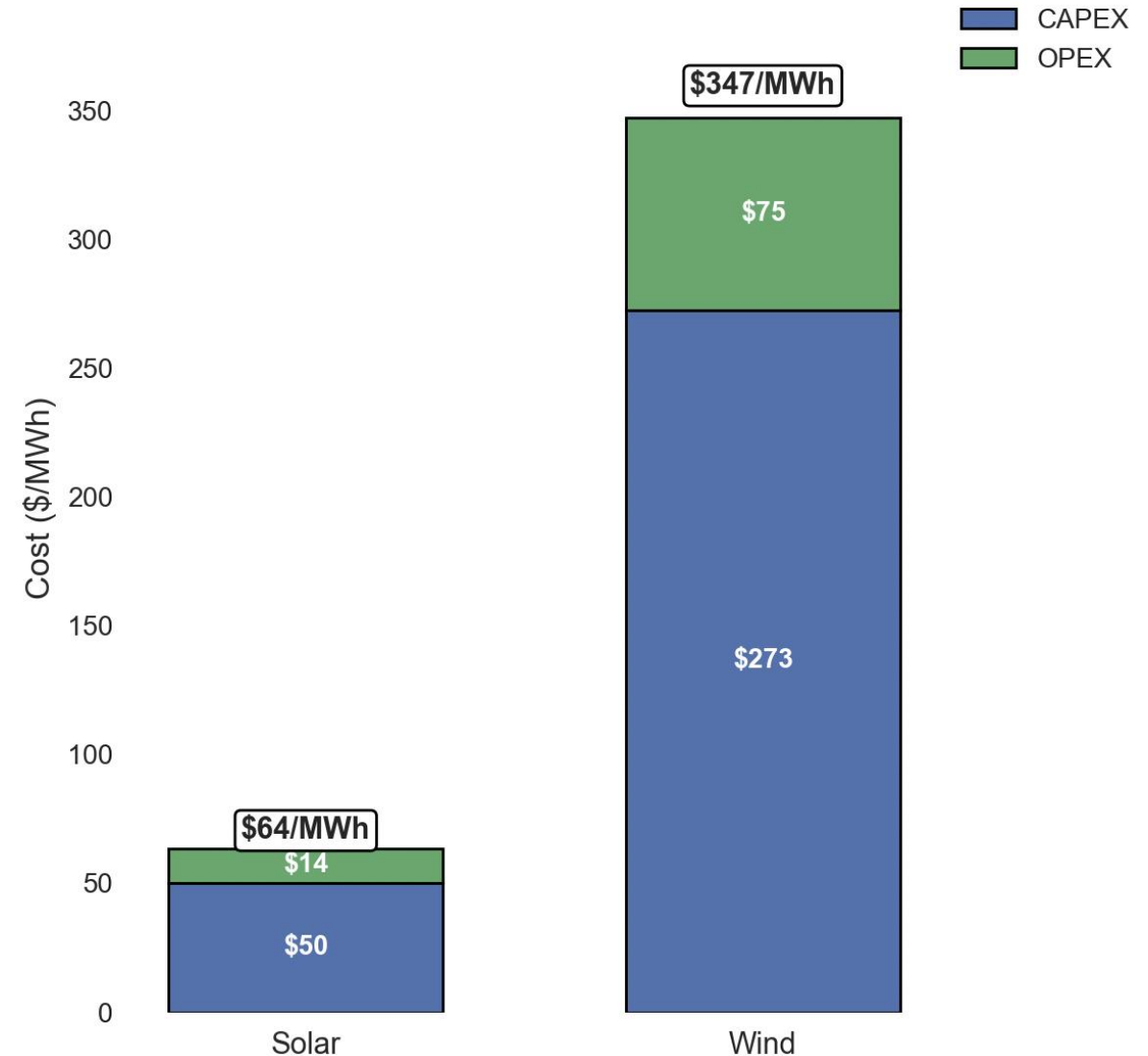


**Average Daily Generation Profile
Rondonópolis, Brazil**

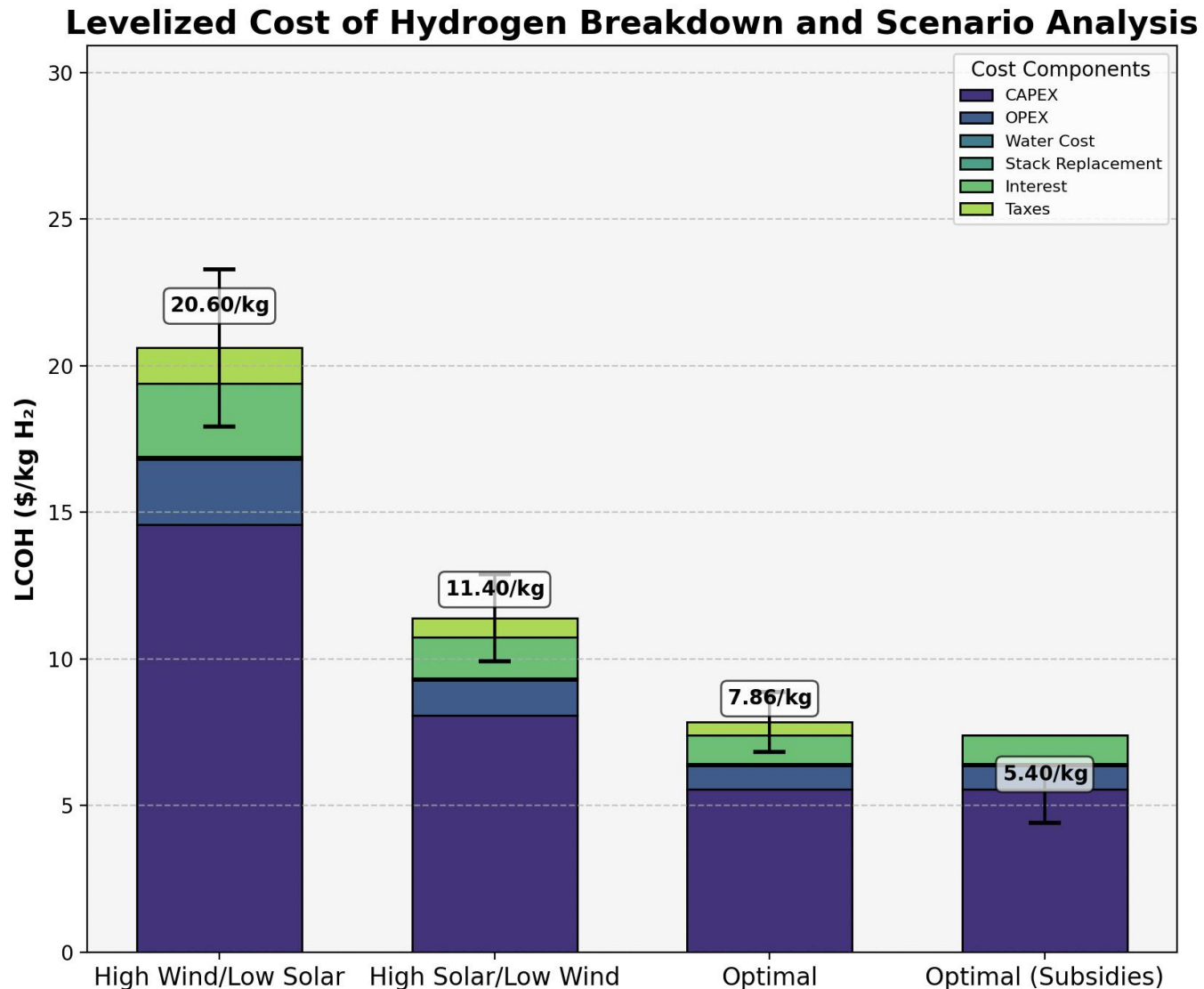


Low wind capacity factors make **solar the only viable option** for behind-the-meter, new build renewable energy.

Solar vs. Wind LCOE Breakdown



High Cost of Capital and CAPEX Translate to Green Hydrogen Costs

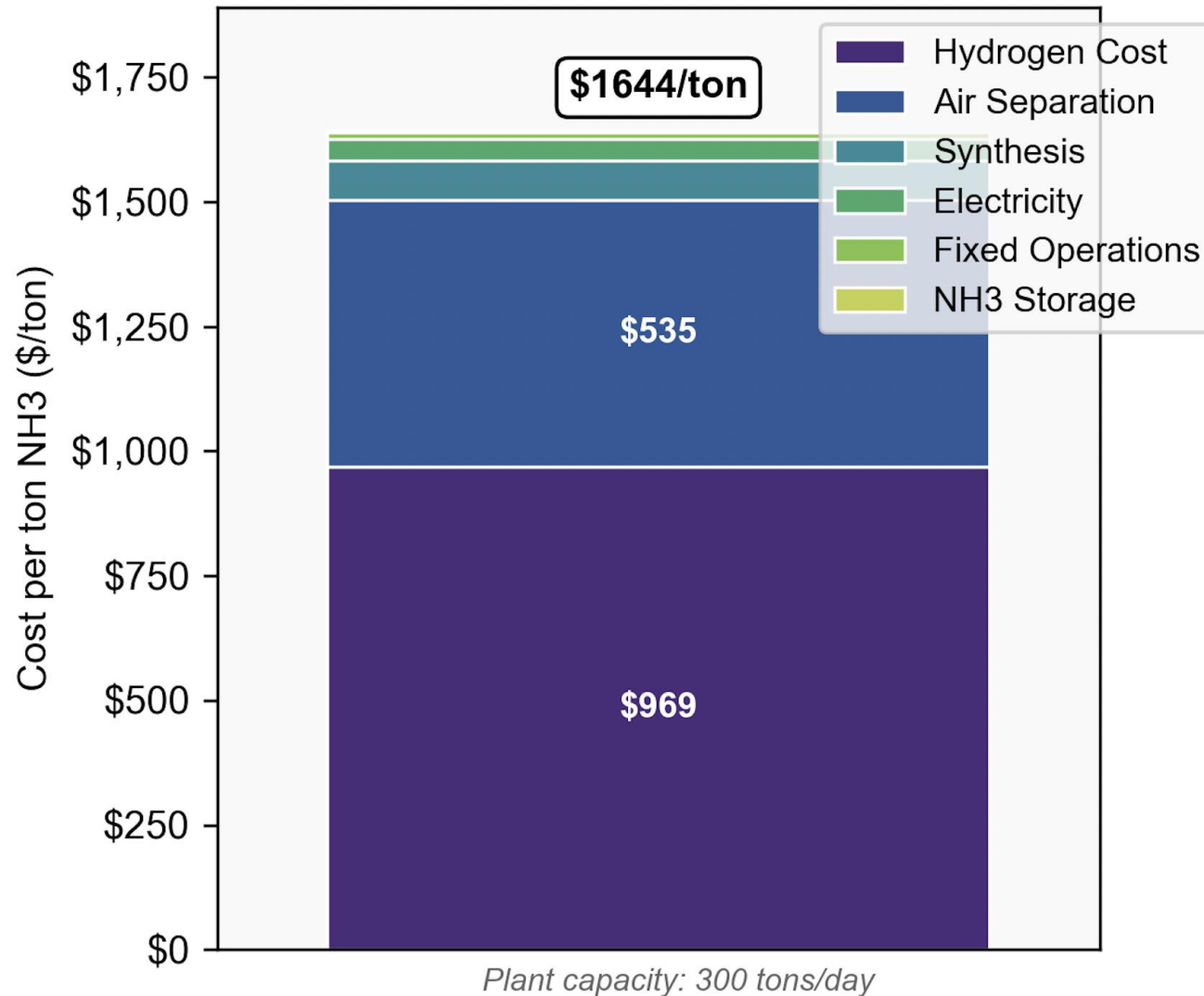


- High upfront CAPEX and financing costs lead to high hydrogen prices.
- Optimized renewable energy sizing reduces hydrogen cost to **\$7.86/kg**. Subsidies could bring this down to **~\$5.40/kg**.
- Brazilian subsidy schemes provide further significant cost reductions:
 - **Rehidro**: Exempts renewable equipment (electrolyzers, solar panels, installation) from taxes, directly lowering capital expenses.
 - **PHBC Tax Credits**: Competitive government initiative designed to fully cover the green hydrogen cost competitiveness gap, estimated at **\$2/kg**.

High Green Ammonia Costs Create Inviably High Urea Prices



Green Ammonia Cost Breakdown



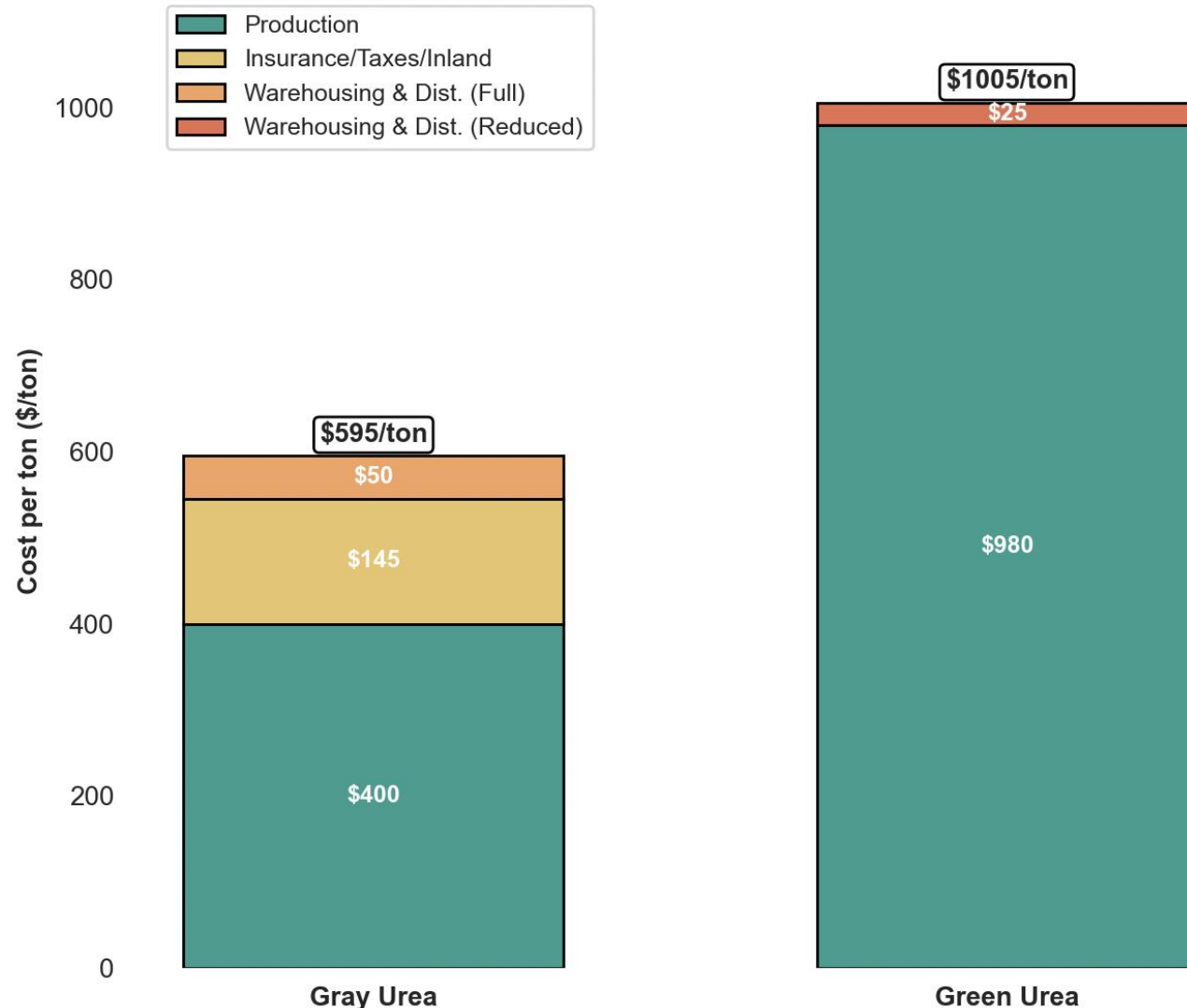
Translates to a Urea price of ~\$980 per ton

- Current CFR Urea market price: ~\$400 per ton
- Green urea is ~2.5 times more expensive than current gray urea.
- Sets an implicit, breakeven carbon price of ~\$0.65/kgCO₂
 - Assumes 910 kgCO₂/ton Urea
- Would require a **hydrogen subsidy of ~\$4.00/kg** to achieve cost parity.
 - Equivalent to a **WACC of ~4%**.

Localized Production Reduces Cost Gap from 150% to 70%



Delivered Urea Cost Breakdown



- Pricing in the effect of local production reduces **cost gap to ~\$400 USD/ton from ~\$600/ton.**
- Local production provides cost savings across:
 - Inland transportation costs
 - Import duties and taxes
 - Warehousing and distribution

Source: Clearview Analysis
Warehousing and insurance/tax/transportation cost data from Argus Media

Volatile Urea Prices Justify a Premium for Stable Fertilizer Supply



- Urea prices are highly volatile and dependent on:
 - Natural gas prices
 - International shipping routes
- Price variability results in **higher crop prices, expensive financing, and lower crop exports**
- Green urea provides a stable alternative while:
 - **Improving import-export balance**
- Estimate that offtakers will **absorb a 15% price increase in levelized cost** to secure stable supply of fertilizer.

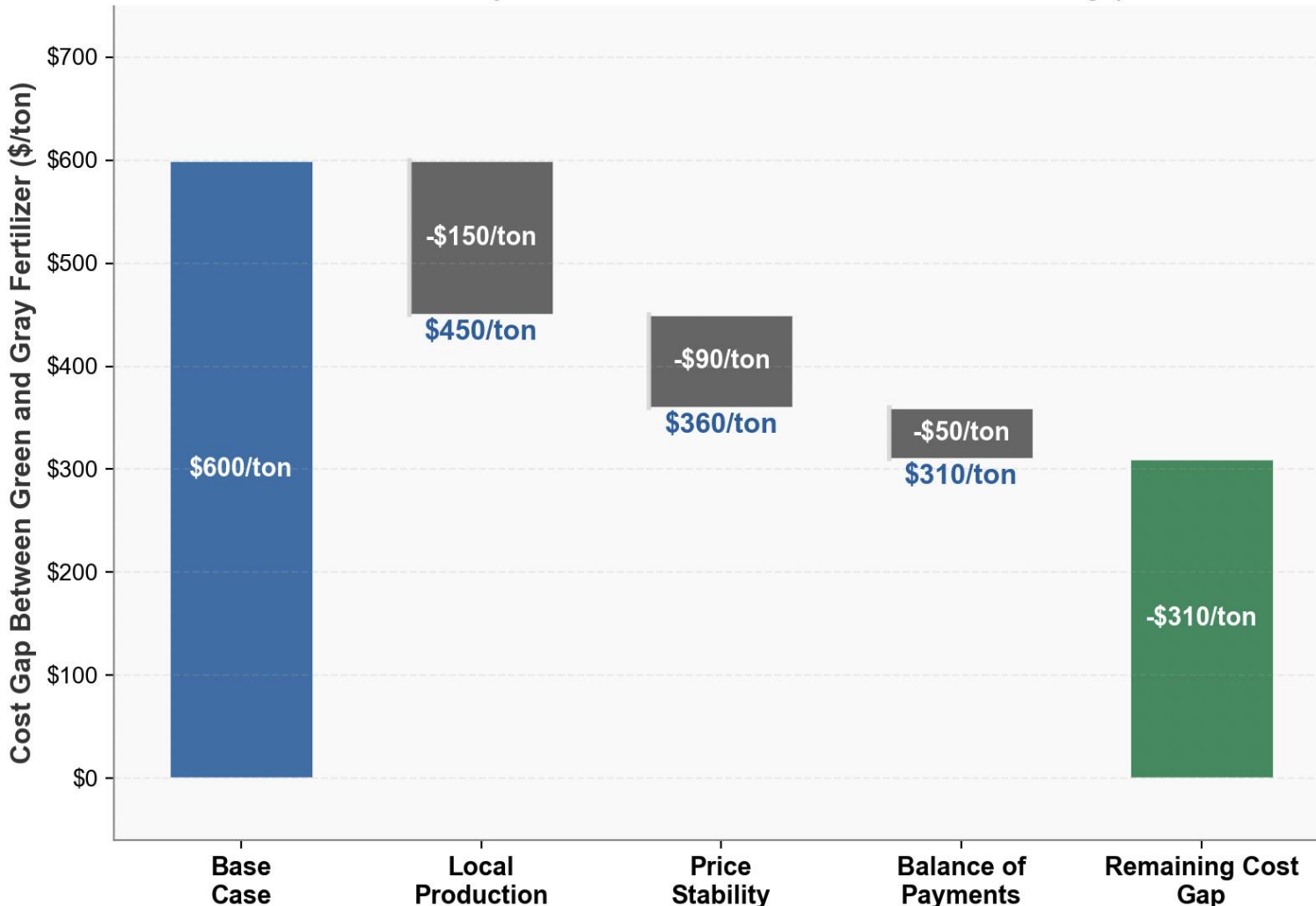


Pricing Externalities Creates Pathways to Economic Viability



How Externalities Bridge the Green-Gray Fertilizer Cost Gap

Each externality creates economic value that reduces the cost gap



- Local production directly eliminates **~\$150/ton**.
- Estimate that farmers will pay a **15% premium** for stable fertilizer prices and supply.
 - Reducing cost gap by **\$90/ton**.
- Estimate that improved foreign exchange provides access to **debt 200 bp cheaper**.
 - Reducing cost gap by **\$50/ton**.
- Accounting for externalities, meeting the remaining cost gap would require a:
 - **LCOH of \$2.75**
 - **WACC of ~7%.**

Conclusions and Next Steps



- **Traditional cost comparisons underestimate green ammonia's viability**
- **Pricing externalities can shift project economics**
- **Localized green fertilizer production offers clear strategic benefits:**
 - Enhanced **fertilizer price stability** for farmers.
 - Improved **national trade balances** (reduced foreign currency expenditure).
 - Reduced vulnerability to international supply disruptions.
- **Next Steps:**
 - Access better data to refine analysis
 - Leverage existing subsidies and incentives to further reduce project costs.
 - Target policy efforts on reducing financing costs (WACC) to competitive levels (~7%).
 - Clearly communicate externality benefits to secure buy-in from investors, policymakers, and offtakers.



Thank You!



If interested in learning more or collaborating, please drop me a message at:

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